

Inventor: Dean et al.**Serial No. 10/065,247****AMENDMENTS TO THE SPECIFICATION:**

Please replace paragraph [0021] with the following amended paragraph:

[0021] The MRI system 2 further includes a static magnet structure 12 including a superconducting magnet 14 having a plurality of superconducting magnetic field coils which generate a temporally constant magnetic field along a longitudinal z-axis of a patient bore 18. The superconducting magnet coils are supported by a superconducting magnet coil support structure 20 and received in a cryostat ~~21~~12.

Please replace paragraph [0022] with the following amended paragraph:

[0022] The temperature sensor 6, coupled to the static magnet structure 12, receives temperature data from the patient bore 18. In other words, the sensor 6 senses an initial ~~bore~~-condition of the patient bore 18 and therefrom generates an initial ~~bore~~-condition signal and also senses a thermal boundary, which ~~is~~has a limit over which the embedded thermal controller 9 will reduce or shut off power to the gradient coil 4, and therefrom generates a thermal boundary signal. Alternate embodiments include a plurality of temperature sensors arranged around the patient bore 18 and coupled to the static magnet structure 12. For example, a first temperature sensor adapted to sense the initial condition and therefrom generate the initial condition signal and a second temperature sensor adapted to sense the thermal boundary and therefrom generate the thermal boundary signal.

Please replace paragraph [0025] with the following amended paragraph:

[0025] Cryostat ~~21~~12 includes toroidal helium vessel ~~39~~21 and main magnetic field shield coil assembly 40. The cryostat ~~21~~12 is coupled to a cryocooler 41. The cryocooler 41 maintains the helium vessel ~~39~~21 at proper operating temperatures.

Inventor: Dean et al.**Serial No. 10/065,247**

Please replace paragraph [0026] with the following amended paragraph:

[0026] The main magnetic field shield coil assembly 40 generates a magnetic field that opposes the field generated by the ~~superconducting-main magnet coils~~ 14. A first coil shield 42 surrounds the helium vessel 39 to reduce "boil off." A second coil shield 44 surrounds the first coil shield 42. Both the first coil shield 42 and the second coil shield 44 are preferably cooled by mechanical refrigeration. The first coil shield 42 and the second coil shield 44 encase a toroidal vacuum vessel 46. The toroidal vacuum vessel 46 includes a cylindrical member 48 that defines the patient bore 18 and extends parallel to a longitudinal axis. On a first exterior side 50 of the cylindrical member 48, which is longitudinal side farthest away from the center 30, of the patient bore 18 is a magnetic gradient coil assembly 52 containing the gradient coil 4. Located on a second exterior side 54 of the magnetic gradient coil assembly 52 is a cylindrical dielectric former 56. A RF shield 58 is applied to the cylindrical dielectric former 56.

Please replace paragraph [0029] with the following amended paragraph:

[0029] The embedded thermal controller 9 includes a control loop, which sets dynamic limits on the power injected into the gradient coils. The limits are determined for each commanded prescription as a function of the ~~thermal-initial and thermal~~ boundary conditions. This is accomplished through a thermal predictor software module, which includes a computational algorithm to model a series of coupled first order dynamic subsystems designed to simulate the actual thermal characteristics of the MRI 5. In other words, the invention uses knowledge of thermal boundary and initial conditions in conjunction with a prediction algorithm to dynamically set limits on the electrical power allowed into the gradient coils 4. This temporally predictive scheme generally allows higher power levels than those employing a simple fixed limit on gradient current. Additionally, when energetic scanner use causes high temperatures, the present invention adjusts the input power to avoid an over-limit condition and resulting halt to scanning.

Inventor: Dean et al.

Serial No. 10/065,247

Please replace paragraph [0035] with the following amended paragraph:

[0035] In operation block 104, the gradient field signal converts into a resulting power signal 105 in response to internal resistances and gains 107 of the gradient coil 4.

[0036] In operation block 106, transfer functions are generated (e.g. $A/(Equation.DSMT401050000020000000f0000004571756174696f6e2e44534d54340000-000000A/(rs + 1) 109)$) as a model of the resulting power level signals from operation block 104.

Please replace paragraph [0037] with the following amended paragraph:

[0037] In operation block 108, the control method 100 the transfer function are summed together to generate the net change in the gradient coil temperature or ΔT_{grad} 115.

Please replace paragraph [0039] with the following amended paragraph:

[0039] In operation block 112, the gradient coil temperature signal 117 is generated from the sum of the boundary condition signals 111 and the ΔT_{grad} signal 115.